Abstract

Distributed data compression and diversity coding are among the most eminent issues in the design of low power wireless sensor networks It is thus desirable to understand the "ultimate" performance limits associated with these two fundamental issues In the first half of the thesis, we study such limits for a sensor network model in which several encoders with access to correlated streams of data communicate with a single decoder over a multiple access channel, and under the availability of side information at different locations in the network The decoder is required to generate lossy estimates of the data streams based on side information and the output of the channel In particular, we obtain an inner bound on the rate region for the afore-mentioned situation We propose a joint compression and diversity coding scheme in the second half of the thesis and obtain an achievable rate region Advantages of considering these two critical design issues jointly includes high robustness and efficiency at considerably low energy requirements